

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION See paragraph 2 below

International application No.
PCT/EP2004/003804

International filing date (day/month/year)
08.04.2004

Priority date (day/month/year)
09.04.2003

International Patent Classification (IPC) or both national classification and IPC
H02J3/38, F03D9/00

Applicant
GENERAL ELECTRIC COMPANY

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - in written format
 - in computer readable form
 - c. time of filing/furnishing:
 - contained in the international application as filed.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. II Priority

1. The following document has not been furnished:

- copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
- translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:

- paid additional fees.
- paid additional fees under protest.
- not paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

complied with

not complied with for the following reasons:

see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

all parts.

the parts relating to claims Nos.

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or
industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1, 3-7, 8-11, 13-15: NO
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-21: NO
Industrial applicability (IA)	Yes:	Claims	1-21: YES
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)
and / or
2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

JC20 Rec'd PCT/PTO 14 SEP 2005

Re Item IV.

Lack of unity of invention

The independent apparatus claim 1 defines an unit for controlling the active power generated by a wind park as a function of the frequency grid.

The independent apparatus claim 7 defines a coupling device using a first variable representative of the wind park for controlling a second variable representative of wind park.

The only common concept to be found between these two claims is the reference to "control of a variable of a wind park according to another variable". This concept is well known in the art (see D4, page 296, column 1, Fig. 9) and cannot as such be said to present a single general inventive concept (Rule 13.1 PCT).

Re Item V.

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 The following documents are referred to in this communication:

- D1: Third International Workshop On Transmission Networks For Offshore Wind Farms (04-2002), Wind Farm Control Software Structure
- D2: KONLOGIANNIS C C ET AL: "An efficient power management and control in wind parks by means of a radio telemetry control system" ELECTROMOTION'01. 4TH INTERNATIONAL SYMPOSIUM ON ADVANCED ELECTROMECHANICAL MOTION SYSTEMS. PROCEEDINGS, PROCEEDINGS OF 4TH INTERNATIONAL SYMPOSIUM ON ADVANCED ELECTROMECHANICAL MOTION SYSTEMS - ELECTROMOTION 2001, BOLOGNA, ITALY, 19-20 JUNE 2001, October 2001 (2001-10), - 20 October 2001 (2001-10-20) pages 461-465 vol.2, XP001154444 2001, Bologna, Italy, Univ. Bologna, Italy ISBN: 88-900615-0-2
- D3: DE 196 20 906 A (SIEMENS AG) 8 January 1998 (1998-01-08)
- D4: 7th Ieee International Power Electronics Congress. Technical Proceedings. Ciep 2000 (cat. No.00th8529), Proceedings Of Ciep 2000. 7th Ieee International Power Electronics Congress, Acapulco, Mexico, 15-19 Oct. 2000 (0000), Modeling and dynamic regulation of a wind farm, 293-297
- D5: WO 03 030329 A (WOBBEN ALOYS) 10 April 2003 (2003-04-10)
- D6: First/second International Workshop On Transmission Networks For Offshore Wind Farms (03-2001), Grid Connection and Remote Control for the Horns Rev 150MW Offshore Wind Farm in Denmark, 1-11

D7: DE 100 22 974 A (WOBBEN ALOYS) 22 November 2001 (2001-11-22)

- 2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **independent claims 1, 7, 13 and 14** is not new in the sense of Article 33(2) PCT.
- 2.1 D1 shows a control software structure for wind farms. A supervisory controller (wind farm main controller) acting as interface between the grid operational system and the wind turbine units of the farm is disclosed. The wind farm controller is responsible for the power set point distribution and proper scheduling methods for running the farm and also provides voltage and frequency control capabilities.
- Thus, in respect of **claim 1**, document **D1** discloses (the references in parentheses applying to this document):

- *a wind farm* (page 2, Fig. 1, wind farm unit) *with at least two wind turbines* (Fig. 1, wind turbine units 1, 2... n) *connected to a power grid* (power grid) *comprising*
 - *a control unit* (Fig. 1, wind farm controller) *connected to said at least two wind turbines*
 - *a sensor unit* (page 5, Fig. 3 shows data measured and transmitted to the control unit; page 6, paragraph 4, Data section) *connected to said power grid and said centralized control unit*
- wherein*
- *said sensor unit is adapted to measure the grid frequency of said power grid and to transmit said measured frequency to said control unit* (the measurement of the frequency grid and transmission to the wind farm controller is implicit when the wind farm controller provides primary control, which has a clear technical meaning that the controller alter power delivered by the generators until balance is re-established between power output and consumption, when the frequency exceeds the permissible limits)
 - *said control unit is adapted to control the output of real power of said wind farm according to said measured grid frequency* (section 2 Wind Farms, page 2, after Fig. 1, primary operation mode, in this mode the wind farm must be able to participate in frequency and voltage control for the AC grid)

Therefore, the subject-matter of claim 1 lacks novelty.

Moreover D2 shows in page 462, Fig 1 and page 463, paragraph 1 measurement of grid parameters voltage and frequency and transmission to the central control unit of the wind park.

- 2.2 In respect of **independent claim 7**, document **D3** (Fig. 3, abstract and Fig. 6, col. 7) discloses (the references in parentheses applying to this document)

- *a wind farm (Fig. 3, Windenergiepark 2) with at least two turbines (Fig. 3, Windenergieanlagen 4) connected to a power grid (Fig. 3, Versorgungsnetz 22)*
- *a coupling device (Fig. 3, netzseitige Stromrichterstation 46) for coupling the wind farm to the power grid (Fig. 3, Versorgungsnetz 22)*
- *a sensor element (Fig. 6, netzseitige Stromrichterstation 46, Ud_i, Id_i, Pd_i) for sensing a first variable (Leistungs-Istwert Pd_i) representative of said wind farm wherein*
- *said sensor is adapted to transmit said measured first variable to said coupling device (Fig. 6, Einrichtung 102 Leistungs_Istwert Pd_i)*
- *said coupling device is adapted to control a second variable (Sollwertepaar Uo_i, Io_i) of said wind farm according to said measured first variable*

D4 (see page 296, column 1, Fig. 9 and page 293, Fig. 1) and D1 (wind farm operating on balance control mode, page 2) also discloses the subject-matter of claim 7.

- 2.3 The subject-matter of **independent claims 13 and 14** corresponds in terms of method features to that of claims 1 and 7, respectively. The objections raised in respect of these latter claims, therefore, apply mutis mutandis, to the subject-matter of independent claims 13 and 14 which do thus not meet the requirements of Art.33 (2) in respect of novelty.
- 3 Dependent claims **2-6, 8-12 and 15-21** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the EPC with respect to novelty or inventive step, the reasons being as follows:

Claim 2 defines that "*the sensor unit is a separate substation or integrated into one of said at least two wind turbines*". This feature is disclosed in D7 (see Fig. 3, paragraph 0017).

Claims 3 and 17 define that "*the control unit is adapted to shut down individual wind turbines within the wind farm*". This feature is disclosed in **D1** (see page 8, section 4 Wind Farm Main Controller, Fig. 5, 6 and Wind Farm Management Block and Unit Scheduler Function, pages 9-10).

Claim 4 defines that "*a centralized control unit is adapted to gradually reduce the power output of individual wind turbines within the wind farm*", which is disclosed by D1, see page 13, Pitch Control Object Block.

Claim 5 defines that "*the control unit comprises a selection unit for selecting individual wind turbines within the wind farm*". This feature is disclosed in **D1** (see page 8, section 4 Wind Farm Main Controller, Fig. 5, 6 and Wind Farm Management Block and Unit Scheduler Function, pages 9-10).

Claim 6 defines that "*the sensor unit is adapted to transmit said measured grid frequency to said control unit by radio, optical, sound and electrical signal means*". This feature is disclosed in **D1**, see Fig. 1 and page 2, first paragraph. D6 (page 10-11) and D3 (page 465, column 1) also discloses this feature.

Claim 8 defines that "*the sensor element is integrated into said coupling device*". This feature is disclosed in **D3**, Fig. 6, 46, U_d_i and I_d_i measurements at the terminals 56 and 58.

Claim 9 defines that the first variable is the actual power output of the wind farm, the total current output of the wind farm or the actual voltage at the point of coupling. This is disclosed by **D3**, Fig. 6, col. 7, Leistungs-Istwert P_d_i .

Claim 10 defines that the second variable is the total current output. This is disclosed by **D3** Fig. 6, col. 7, Sollwertepaar U_o_i and I_o_i .

Claim 11 defines that "*the coupling device comprises semiconductor switching devices to regulate the power output*". This is disclosed by **D3**, Abstract, Fig. 3,

46 netzseitige Stromrichterstation, 50 Wechselrichter.

Claim 12 is disclosed in **D1**. D1 shows a wind farm being able to operate according to different control modes: primary control and power balance control. In the first mode the wind farm provides frequency control by regulating active power output as a function of the frequency grid. In balance mode, a power reference is set by the energy management system, the power output from the wind farm is measured (first variable), deviation against a set point is calculated and a variable of the wind farm is regulated according to it.

Claim 15 defines that said second variable is the actual voltage at the point of coupling. This is disclosed by **D3**, Fig. 6, col. 7.

Claim 16 defines "*the criteria for selecting the at least one turbine are life time, maintenance considerations and operating or load conditions of an individual wind turbine*". This feature is disclosed in **D1**, see page 10, Unit Scheduler Function.

Claim 20 defines operation of the wind farm at maximum total power output while frequency stays within a predetermined range and reduction of the power output when the grid frequency exceeds upper boundary value of said range. This feature is disclosed in **D1**. D1 shows different operation modes that might be used by the wind farm controller to run the wind farm under different conditions, eg: running the wind farm at maximum power level and switch to primary control in case of overfrequency (see page 2, second paragraph).

In respect of **claim 21**, **D1** shows different operation modes that might be used by the wind farmer controller to run the wind farm under different conditions, eg: running the wind farm in power balance mode, so that set point is received from the EMS and distributed to each single wind turbine by the wind farm main controller, where the set point might be under maximum and switching to primary mode if the frequency exceeds permissible limits (page 2).

**Re Item VI.
Certain documents cited**

**WRITTEN OPINION OF THE
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AUTHORITY (SEPARATE SHEET)**

International application No.
PCT/EP2004/003804

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (<i>valid claim</i>) (day/month/year)
WO03030329	10/04/2003	21/09/2002	28/09/2001

Re Item VIII.

- 1 **Claims 18 and 19** define identical subject-matter. The applicant is requested to remove one of them.
- 2 The present application does not meet the requirements of Art. 6 in respect of **clarity** for the following reasons:
 - **Claims 20 and 21:** the formulation of said claims is not clear, since it is not evident if the claims refer to part of the claims 13-18 or to the claims 13-18 as a whole. The following formulation would seem to overcome the objections of clarity: " a procedure/method according to any of claims 13-18, comprising the steps of:"